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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,771	10/24/2003	Thomas Wolff	WOLFF-4	1970
20151	7590	07/22/2005	EXAMINER	
HENRY M FEIEREISEN, LLC 350 FIFTH AVENUE SUITE 4714 NEW YORK, NY 10118			CHEN, ERIC BRICE	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 07/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/693,771

Applicant(s)

WOLFF, THOMAS

Examiner

Eric B. Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 14-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,8-11 and 13 is/are rejected.
- 7) ☒ Claim(s) 3-7 and 12 is/are objected to.
- 8) ☒ Claim(s) 1-38 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/21/03; 6/27/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-13, drawn to an etching method, classified in class 438, subclass 689.
  - II. Claims 14-38, drawn to an etching apparatus, classified in class 156, subclass 345.1.
2. The inventions are distinct, each from the other because of the following reasons: Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the etching apparatus can be used to etch any structure, regardless of semiconducting properties.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper. Moreover, because these inventions are distinct for the reasons given above and the search required for Invention I is not required for Invention II, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Henry Feiereisen on June 23, 2005, a provisional election was made with traverse to prosecute Invention I, claims 1-14.

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Affirmation of this election must be made by applicant in replying to this Office action.

Claims 15-38 are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

***Priority***

5. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Germany on Dec. 4, 2002. It is noted, however, that applicant has not filed a certified copy of the 102 56 821.9 application as required by 35 U.S.C. 119(b).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-2, 8-10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stutz (U.S. Patent No. 6,127,280) in view of Notten et al., *Etching of III-V Semiconductors*, Elsevier Science Publishers (1991).

9. As to claim 1, Stutz discloses a method for photo-electrochemically etching a semiconductor sample, comprising the steps of: bringing a semiconductor sample (21) in contact with an electrolyte liquid (24), thereby forming a contact area (column 3, lines 37-44; Figure 1), irradiating the contact area of the semiconductor sample through the electrolyte liquid with UV light (26) (column 3, lines 60-67), thereby generating a photo current (column 4, lines 39-40); and measuring the photo current (column 4, lines 39-40).

10. Stutz does not expressly disclose repeatedly subjecting the contact area to a jet of fresh electrolyte liquid. Notten teaches the use of a micro-electrochemical flow-cell for the controlled etching of a small area of a semiconductor crystal (pages 43-44; Figure 3.4 (B)), in which the electrolyte etchant is continuously pumped through the cell (page 45). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to repeatedly subjecting the contact area to a jet of fresh electrolyte liquid. One who is skilled in the art would be motivated to accurately control the etching of a semiconductor crystal.

11. As to claim 2, Stutz discloses that the semiconductor sample is made of gallium nitride (column 2, lines 23-26; column 3, lines 60-67).

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12. As to claim 8, Notten discloses that the jet of fresh electrolyte liquid is created by a pump in form of a pressure surge (page 45).

13. As to claim 9, Stutz discloses that the semiconductor sample (24) is held replaceable in a vertical position (column 3, lines 37-40; Figure 1).

14. As to claim 10, Stutz discloses that the contact area has a diameter of 1 to 4 mm (column 4, line 1).

15. As to claim 13, Stutz discloses that the electrolyte liquid is an aqueous diluted caustic potash solution (KOH) having a concentration in the range of 0.002M to 0.1M (column 3, lines 44-46).

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stutz, in view of Notten, in further view of Hu (U.S. Patent No. 6,884,740).

17. As to claim 11, Stutz discloses the step of providing a reference electrode (20) at the semiconductor sample (column 3, lines 29-36). Stutz does not expressly disclose applying a voltage of -0.5 V to +0.5 V between the semiconductor sample and the reference electrode. Hu discloses a method for photo-electrochemically etching (column 2, lines 55-63) a semiconductor sample (column 5, lines 56-67) and further teaches that the morphology of the etch depends upon material structure, etchant concentration, the bias, and intensity of illumination (column 6, lines 3-5). Moreover, Hu teaches, by disclosing that the bias voltage may be varied, that this parameter appears to reflect a result-effective variable which can be optimized. See MPEP § 2144.05 II. Bias voltage can be varied according, depending on the desired outcome of the etching step, such as surface morphology. Therefore, it would have been obvious to one of

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ordinary skill in the art at the time the invention was made to apply a voltage of -0.5 V to +0.5 V between the semiconductor sample and the reference electrode. One who is skilled in the art would be motivated to optimize through routine experimentation of bias voltage to achieve a desired morphology. See MPEP § 2144.05 II.

### ***Allowable Subject Matter***

18. Claims 3-7 and 12 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. The following is a statement of reasons for the indication of allowable subject matter for claim 3: the prior art fails to teach or suggest that the contact area is irradiated repeatedly with UV light irradiation of said UV light for a predetermined time, whereby a waiting time is generated between each of said UV light irradiations, and wherein said jet of fresh electrolyte liquid is applied to said contact area in said waiting time between two of said UV light irradiations.

20. The following is a statement of reasons for the indication of allowable subject matter for claim 12: the prior art fails to teach or suggest that the jet of fresh electrolyte liquid is applied for 0.1 to 2.0 seconds to the contact area.

### ***Conclusion***

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mlcak et al. (U.S. Patent No. 5,338,416) discloses the

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photochemical etching of silicon in which the HF etching solution is circulated. Hu et al. (U.S. Patent No. 5,773,369) disclose laser-enhanced wet etching of Group III nitrides. Peng et al. (U.S. Patent No. 5,895,223) discloses a method of etching a nitride material in an electrolysis liquid exposed to UV light.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Chen whose telephone number is (571) 272-2947. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NADINE G. NORTON  
SUPERVISORY PATENT EXAMINER  
*Nadine*

July 14, 2005  
EBC

*EBC*